

*Am Lp*

N° 22,172



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PROVISIONAL SPECIFICATION.

Improvements in or applicable to Artificial Limbs.

I, HENRY YEARSLEY, of 6, Gleaves Road, Eccles, in the County of Lancaster, Engine Driver, do hereby declare the nature of this invention to be as follows:—

This invention relates to the construction of an artificial foot and ankle joint, and means for attaching the same to the stump of the leg to be used in cases of amputation below the knee joint and consists principally in the application to such artificial limbs of the pneumatic principle, the objects being to reduce weight, facilitate movement, and give increased flexibility without undue pressure upon the stump of the limb.

The improved artificial foot is made in the form of a hollow boot of india rubber, provided with two air chambers each having an inflating tube fitted with a suitable valve or valves; the thickness of the india rubber being such that the foot shall be flexible but shall be sufficiently resilient to enable it to return to its original shape when the weight or pressure is taken off.

This india rubber boot is supported in the interior by means of two wooden blocks so formed as to be a sufficient support or substitute for the lower part of the "tibia" or principal bone of the leg, and the "os calcaneum" or principal bone of the foot, the two parts working together with a cup and ball joint so placed and formed as to allow of a motion corresponding to that of the ankle joint. The cup and ball are faced with india rubber, and the cup is so mounted in the foot or heel block that it can be adjusted by means of a screw or otherwise, as the surfaces become worn.

The india rubber boot and the upper or leg block terminate about six inches (more or less) above the heel, the outside of the rubber being rebated round the top for about an inch down, and fitted into a casing of leather or other suitable material which is fixed thereon and encloses the stump of the limb to which the foot is to be attached.

The interior of the upper part of this casing is provided with a pneumatic cushion capable of inflation and fitting round the stump, so as to support the artificial limb and connect it thereto firmly, without undue pressure. The leather or other casing is also provided with buckles and straps, or with holes and laces or other suitable means of attachment, and in the case of a short stump, such as when amputation has taken place at or close to the knee joint, the leg or casing must extend above the knee and be provided with an artificial knee joint made by preference of aluminium.

Dated this 25th day of September 1897.

GEO. DAVIES & SON,  
Agents for the Applicant, 4, St. Ann's Square, Manchester.

[Price 8d.]

## COMPLETE SPECIFICATION.

## Improvements in or applicable to Artificial Limbs.

I, HENRY YEARSLEY, of 6, Gleaves Road, Eccles, in the County of Lancaster, Engine Driver, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

This invention relates to the construction of an artificial foot and ankle joint 5 and means for attaching the same to the stump of the leg, to be used in cases of amputation below the knee-joint, and consists principally in the application to such artificial limbs of the pneumatic principle, the objects being to reduce weight to facilitate movement, and to give an increased flexibility without undue pressure upon the stump of the limb.

The manner in which my said invention is to be performed or carried into practical effect will be readily understood on reference to the drawings hereunto annexed and the following explanation thereof. 10

Fig. 1 is a section showing one form of my invention, and Fig. 2 is a modification thereof; Figs. 3 and 4 illustrate the application of my invention to a long 15 stump and a short stump respectively.

The improved artificial foot (see Fig. 1) is made in the form of a hollow boot *a* of india rubber, provided with two air chambers *b*, each having an inflating tube *c* fitted with a suitable valve or valves; the thickness of the india rubber being such that the foot when inflated shall be flexible, but shall be sufficiently 20 resilient to enable it to return to its original shape when the weight or pressure is taken off.

This india rubber boot *a* is supported in its interior by means of two wooden blocks, one *d* being so formed as to be a sufficient support or substitute 25 for the lower part of the "tibia" or principal bone of the leg and the other block *e* to act as the "os-calcis" or bone of the heel, the two parts working together with a cup and ball joint so placed and formed as to allow of a motion corresponding with that of the ankle joint.

The cup *f* carried by the piece *e* and ball *g* attached to the piece *d* are made of or faced with india rubber, and the cup *f* is so mounted in or on the foot 30 or heel block *e* that it can be adjusted by a screw *h* or otherwise as the surfaces become worn.

The india rubber boot or foot *a* and the upper leg block *d* terminate about six inches (more or less above the heel) the outside of the rubber (as shown at *x*) being rebated round the top for about an inch down and fitted with a casing *i* 35 of leather, or other suitable material, which is fixed thereon and encloses the stump *k* (see Figs. 3 and 4) of the limb to which the foot is to be attached.

The interior of the upper part of this casing *i* is provided with a pneumatic cushion *l* capable of inflation and fitting round the stump *k*, so as to support the limb and connect the artificial foot thereto firmly, without undue pressure; 40 and sometimes where the stump is short I propose to use a loose tube of leather between the outer casing and the pneumatic cushion.

In some cases more especially where amputation has taken place close to the knee-joint it is also necessary to provide a leather or other casing *m* (see Figs. 3 and 4) for the upper half of the leg, and to provide the same with buckles and 45 straps, or with holes and laces, or other suitable means of attachment, and an artificial knee joint may be provided at *n* made by preference of aluminium.

As a modification (see Fig. 2) I sometimes make the block *d* of aluminium and I prolong the front part of the block *e* forwards as at *e<sup>x</sup>* so as to strengthen

*Yearsley's Improvements in or applicable to Artificial Limbs.*

the sole of the boot forming a joint at *o* of india rubber so as to allow of the bending of the toe portion thereof; and instead of using a ball-and-socket joint I insert between the blocks *d* and *e* a solid block of india rubber as shown at *p*.

I also use two slotted safety links *p'* (see Fig. 2<sup>a</sup>) one on each side of the blocks *d* and *e*, and near the back attached to the blocks by means of studs *p<sup>x</sup>*, in order to prevent any too free movement of the ankle joint in case of accident to the back air casing or chamber.

Also instead of making the boot *a* all of india rubber as shown at Fig. 1, I may sometimes prefer to make the same of leather or cloth or both leather and cloth with an india rubber lining as shown at Fig. 2, and to give a more natural motion to the foot I also prefer to insert a strip of pigskin or other stout leather *q* fixed at one end to the block *d* and at the other end to the block *e'* so as to act as the "tendon Achilles", and a similar strip *r* at the front of the two blocks, as well as a strip *s* to prevent too much bending at the toe joint *o*.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I claim is:—

1. In an artificial foot the combination of an air-tight india rubber chamber at the upper part of the foot extending from the point of the toes to the ankle at the front of the foot and a second air-tight india rubber chamber fixed at the upper part of the heel extending from the tip of the heel to the ankle at the back of the foot, these two chambers being separately inflated substantially as hereinbefore described.

2. The combination of an ankle joint such as seen at Figs. 1 and 2 with the two separately inflated air chambers substantially as described with reference to the said figures.

3. The combination with an artificial foot of an inflatable cushion fitting around the stump of the leg and materially adding to the comfort of the wearer substantially as hereinbefore described and illustrated by the annexed drawings.

4. The improved construction of artificial foot and ankle joint and means for attaching the same to the stump of the leg substantially as hereinbefore described and illustrated by the drawings annexed.

Dated the 24th day of June 1898.

GEO. DAVIES & SON,

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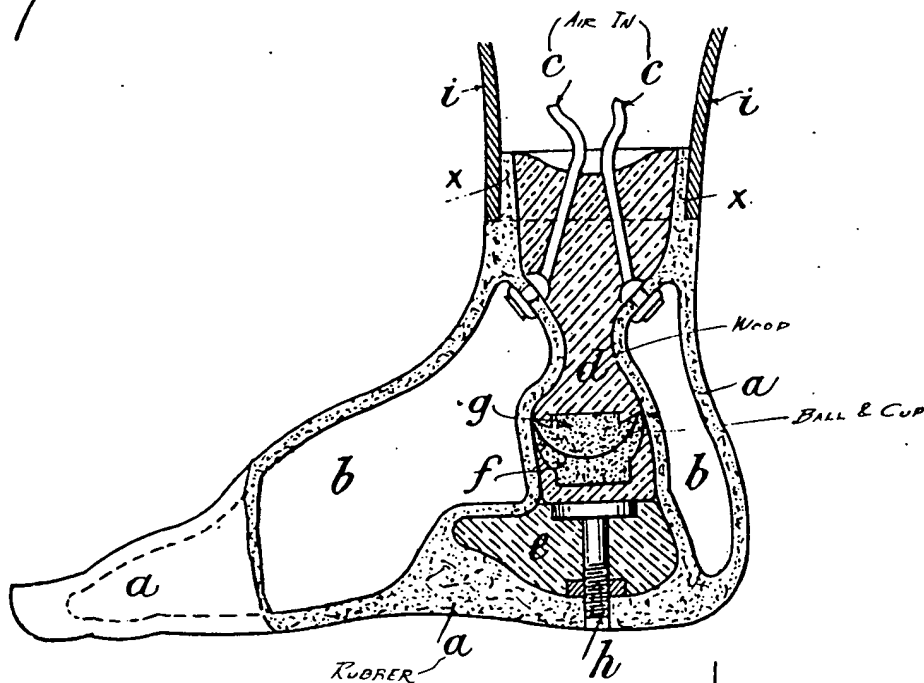
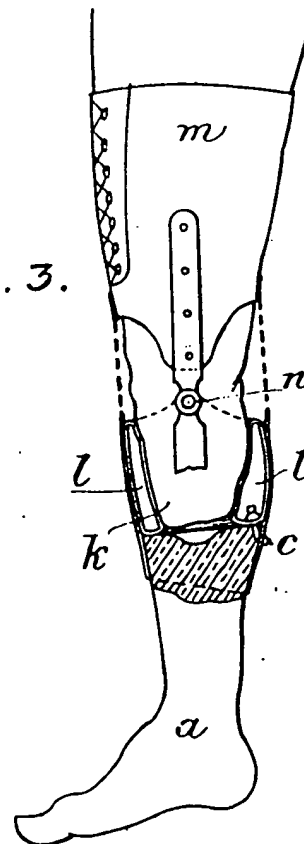


FIG. 3.



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FIG. 2.

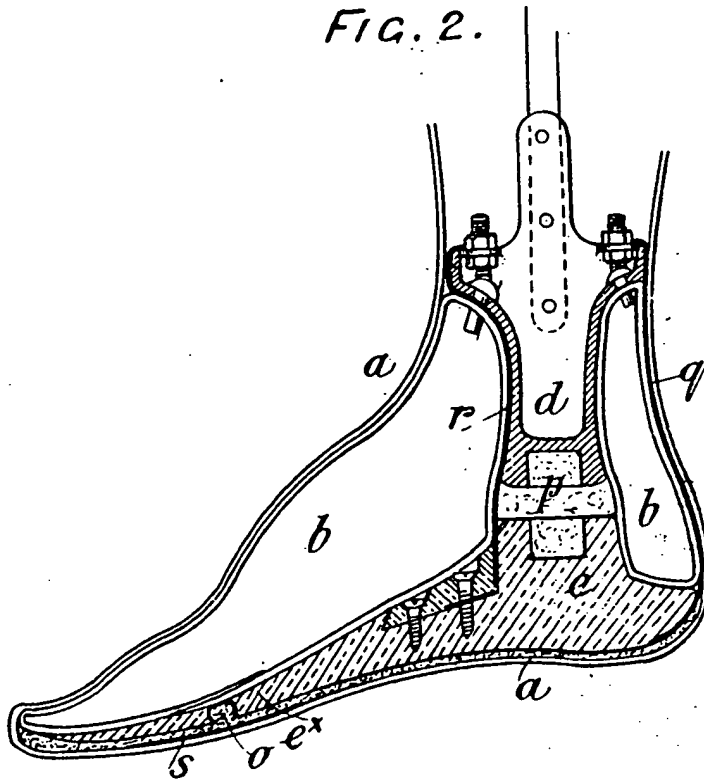
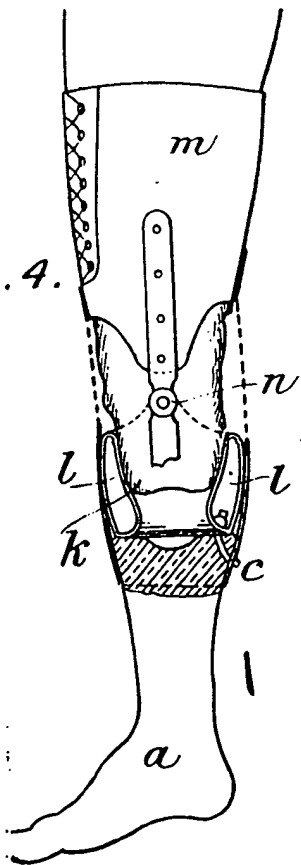
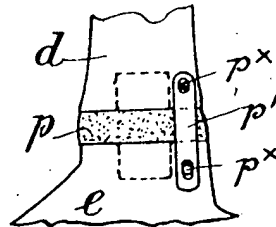


FIG. 2.<sup>a</sup>



[This Drawing is a reproduction of the Original on a reduced scale.]